

# PUNCH-OUT™

## OPERATION MANUAL

MODEL NO: CHP1-UP

MODEL NO: CHP1-UP-US

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**Nintendo®**

Revision 1

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**WARNING**

This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment, Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

**WARNING**

Use of non-Nintendo parts or modifications of your Nintendo game circuitry may adversely affect the safety of your game, and may cause injury to your players.

# 1. Location Setup

## A. Game Inspection

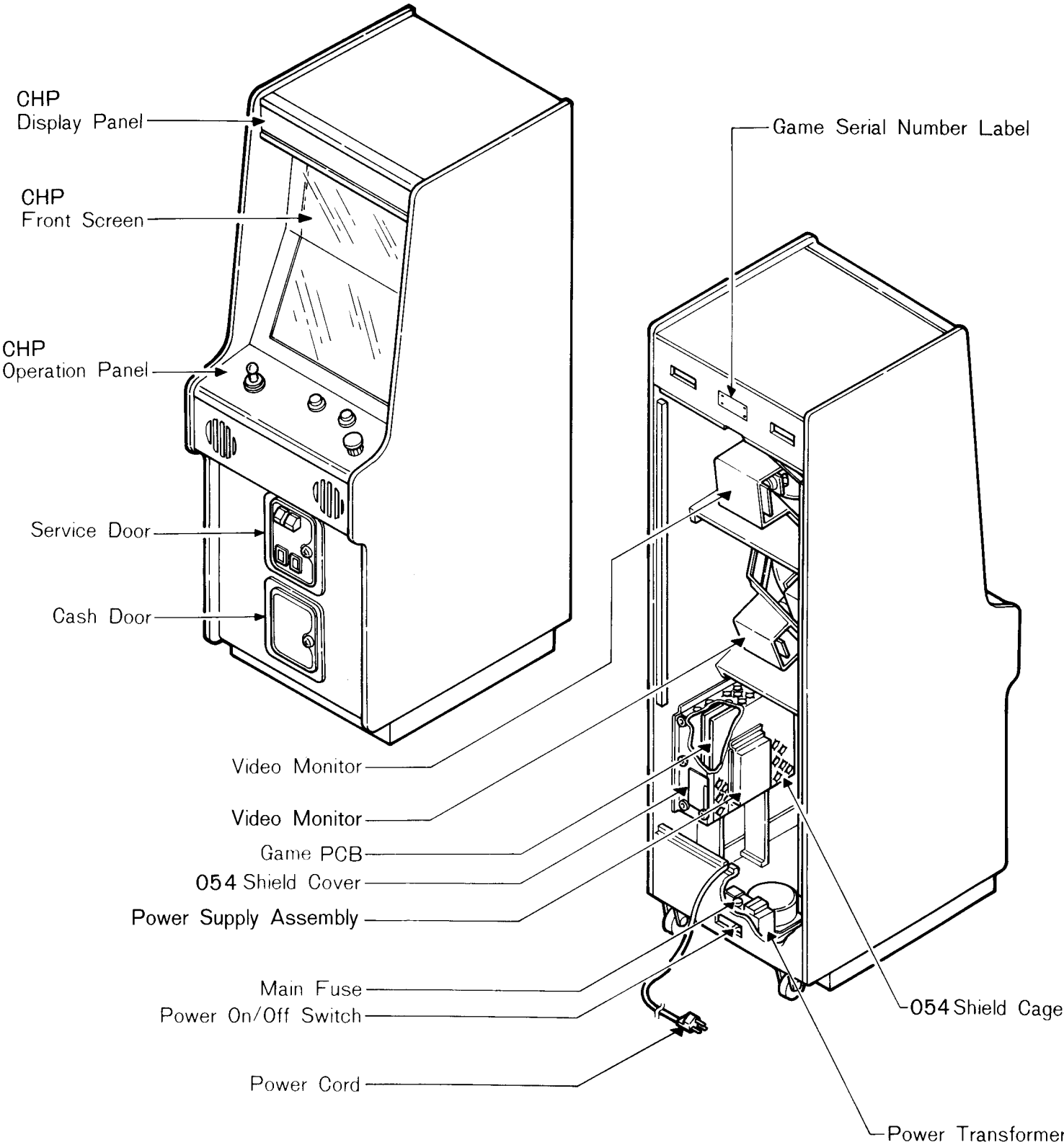


Fig. 1 Game Overview

**WARNING**

Check before plugging the game in !

The game "PUNCH-OUT™" is shipped ready for operation, but a last visual check should be made to insure the final touch of quality control. Please check the following to help us insure that your new game was delivered to you in good condition.

- (1) Check the exterior of the game for shipping damage, dents, chips, or broken parts.
- (2) Remove the screws on the Rear Door Panel.
- (3) Unlock and open the Rear Door Panel, as well as the Service Door inspect the interior of the game as follows:
  - (a) Check that Plug-in connectors are firmly connected.
  - (b) Check that Plug-in integrated circuits on the Game PCB are firmly connected in their sockets.
  - (c) Check that all major subassemblies such as the Power Supply, Operation Panel, and Video Monitor are properly mounted.
  - (d) Remove the tie-wrap that holds the coiled Power Cord on the inside cabinet wall. Check the cord for any cuts or dents in the insulation.

## B. Game Installation

**Fig. 2      Installation Requirements**

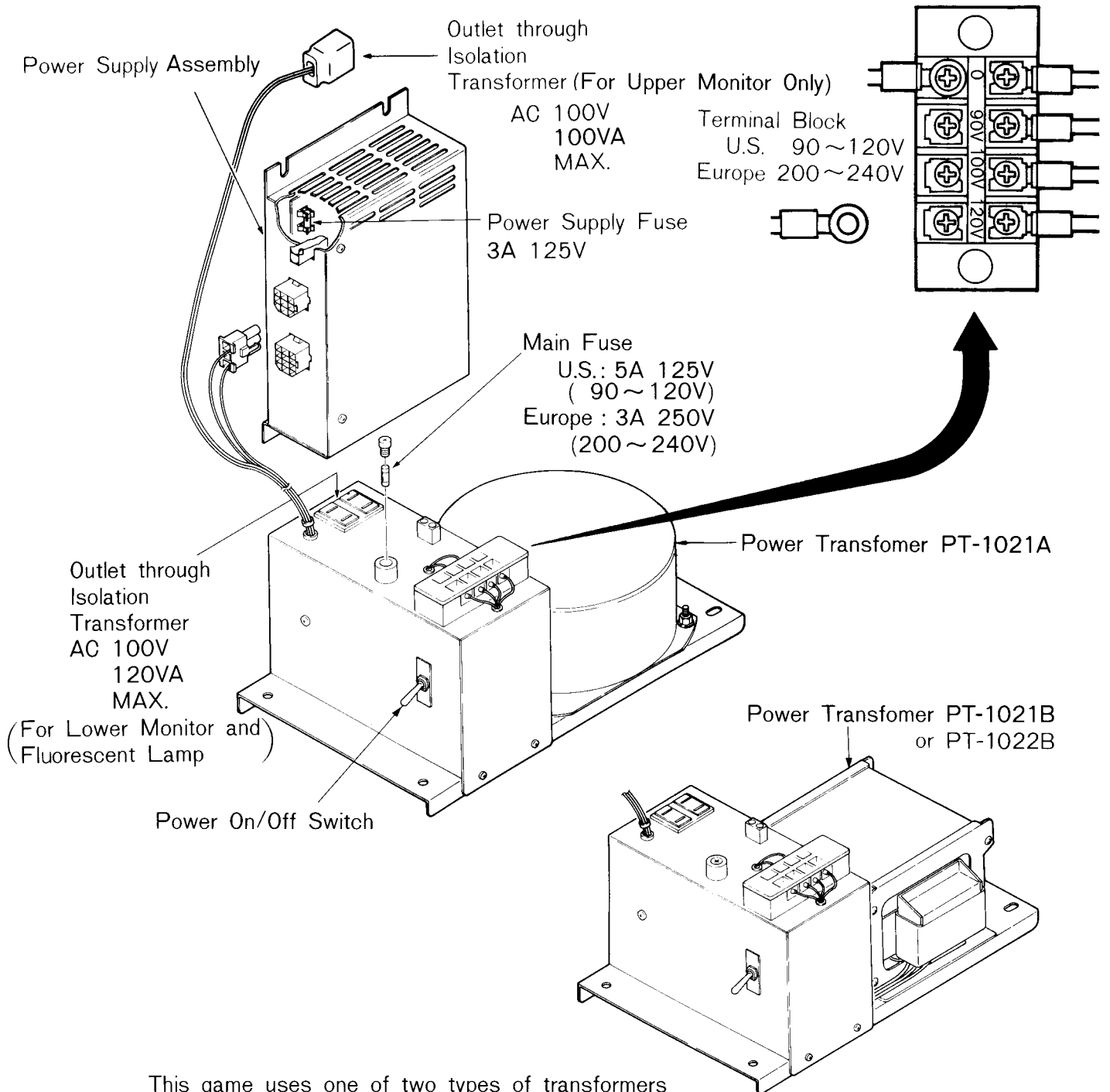
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Power	:	170 watts
Temperature	:	0 to 38 deg.C ( 32 to 100 deg.F)
Humidity	:	Not over 95% relative
Space required	:	63 (W) × 90 (D)cm (24 3/4 × 35 1/2 in.)
Height	:	189 cm (74 1/2 in.)

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### (1) Voltage Selection

Before plugging in your game, make sure the Terminal Block of the Power Transformer is correct for your location's line voltage.



This game uses one of two types of transformers which are different in appearance but identical in function. The two types can be interchanged.

Fig. 3 Power Supply Assembly, Power Transformer and Voltage Selection

## (2) Power On/Off Switch

A Power On/Off Switch is located in the rear of the game at the bottom center of the cabinet. See Fig. 1.

If the results of the preceding steps are satisfactory, you are ready to plug the game in, and set the Power On/Off Switch to the "On" position.

### WARNING

This game MUST be grounded. Failure to do so may result in destruction of electronic components.

### (3) Adjustment of Video Monitor

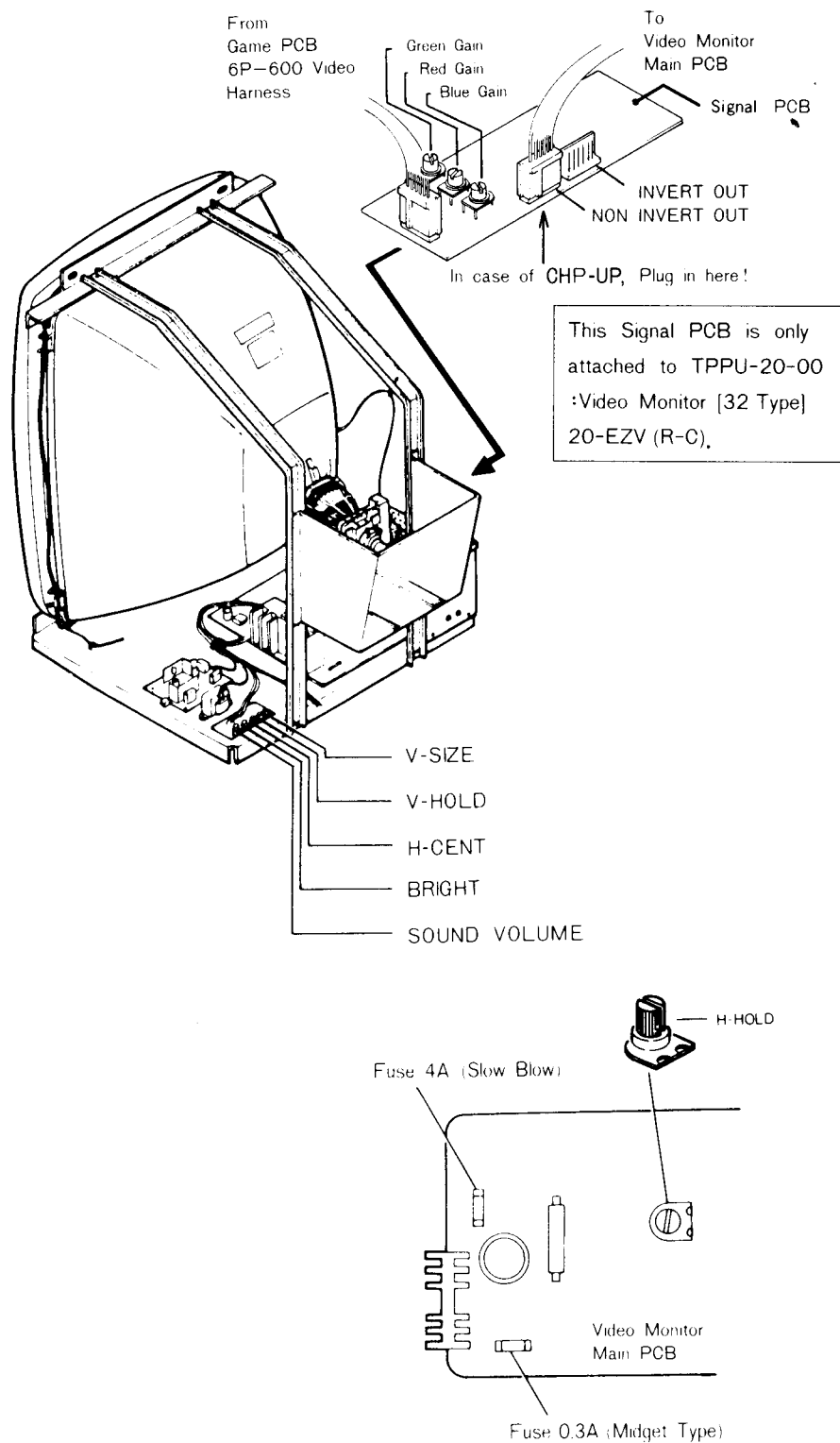


Fig. 4 Video Monitor

#### WARNING

Do not touch the inside of the Video Monitor.  
It contains many parts supplied with high voltage.

## 2. Option Switch Settings

A pair of Option Toggle Switches are mounted on the Game PCB.

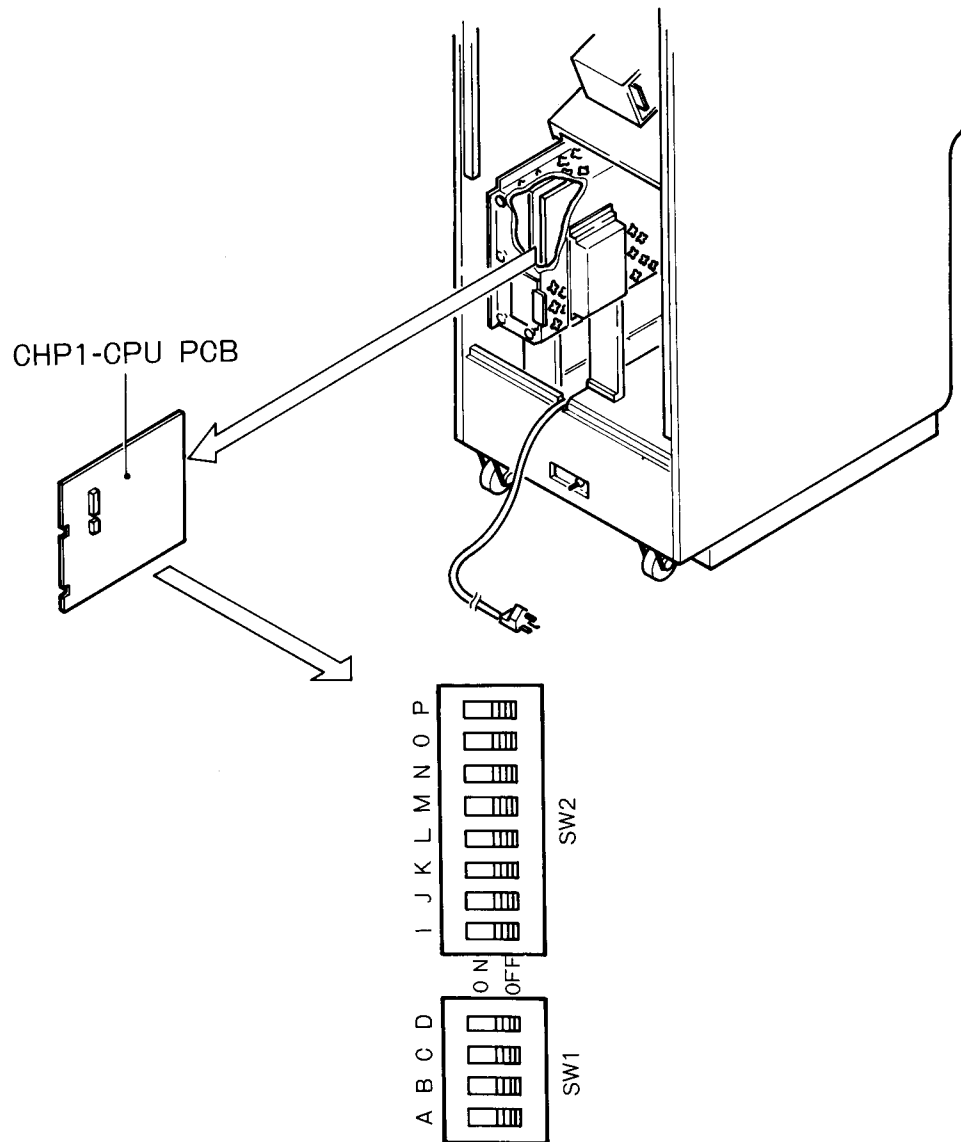


Fig. 5 Option Toggle Switches



## A. Game Price Settings

Fig. 6 Game Price Settings

credit/coin	Toggle (SW1) Settings			
	A	B	C	D
1/3	OFF	OFF	ON	ON
1/2	ON	OFF	OFF	OFF
1/1	OFF	OFF	OFF	OFF
2/1	OFF	ON	OFF	OFF
3/1	ON	OFF	ON	OFF
4/1	OFF	ON	ON	OFF
5/1	OFF	ON	OFF	ON
6/1	ON	ON	ON	OFF
Freeplay	ON	ON	ON	ON

## B. Game Option Settings

Fig. 7 Game Option Settings

		Toggle (SW2) Settings							
		I	J	K	L	M	N	O	P
Game Difficulty									
Easy	(0)	OFF	OFF						
↓	(1)	ON	OFF						
↓	(2)	OFF	ON						
Hard	(3)	ON	ON						
Time									
Long	(0)			OFF	OFF				
↓	(1)			ON	OFF				
↓	(2)			OFF	ON				
Short	(3)			ON	ON				
Attract Music									
Silent	(0)					OFF			
With Music	(1)					ON			
Rematch at a discount									
No	(0)						OFF		
Yes	(1)						ON		
Self-Test/Game									
Game	(0)								OFF
Self-Test	(1)								ON

### WARNING

All the Option Switch Settings MUST be done with Power Off.

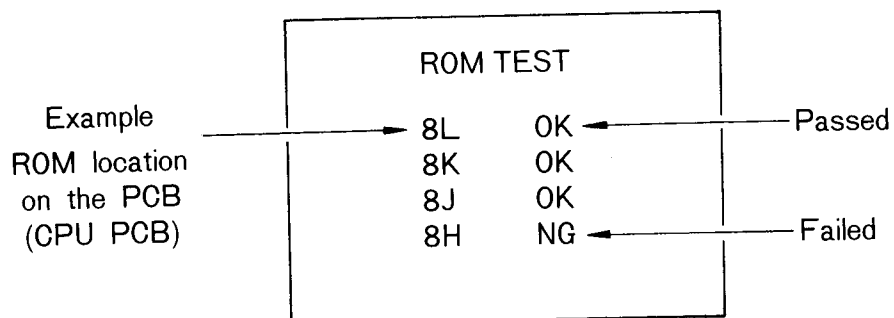
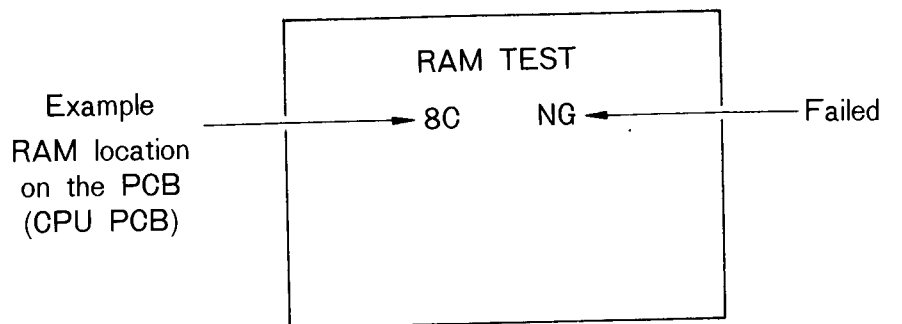
### 3. Self-Test and Bookkeeping

(1) Entry

There are two ways to enter Self-Test and Bookkeeping.

- (a) With pressing Service Switch, set the Power On/Off Switch to the "On" position. Hall of Fame RAM is possible to reset.
- (b) Set the Self-Test Mode with Toggle P (SW2) on the Game PCB. And set the Power On/Off Switch to the "On" position.

(2) Self-Test and Bookkeeping are self-explanatory on the Video Monitor as follows.



## 4. Maintenance and Repair

### A. Fuse Replacement

This game contains 4 fuses. Replace fuses only with the same type as listed below.

Fig 8 Specification of Fuses

(1) Main Fuse	U.S. : 5A 125V ( 90~120V) Europe : 3A 250V (200~240V) See Fig. 1 and 3
(2) Power Supply Fuse	3A 125V See Fig. 3
(3) Video Monitor Fuse	4A 125V 0.3A 125V See Fig. 4

### B. Cleaning

The exterior of the game, all metal parts and all plastic part can be cleaned with a nonabrasive cleanser. You should be careful when cleaning the glass or plastic parts. A dry cloth may cause scratches which will result in a foggy appearance.

### C. Operation Panel

#### (1) Operation Panel Removal

Before repairing or replacing any switches or 4 way Controller on the Operation Panel, unplug the game. Open the Service Door, which are reach through the opening, and unlock the Clamps, located at each end on the underside of the Operation Panel. See Fig. 11.

#### (2) Micro-switch Replacement

Whenever you replace any micro-switch on the Operation Panel, a switch gap adjustment is needed as shown in Fig. 9. Also, see Fig. 17 for layout of Control Panel Switches.

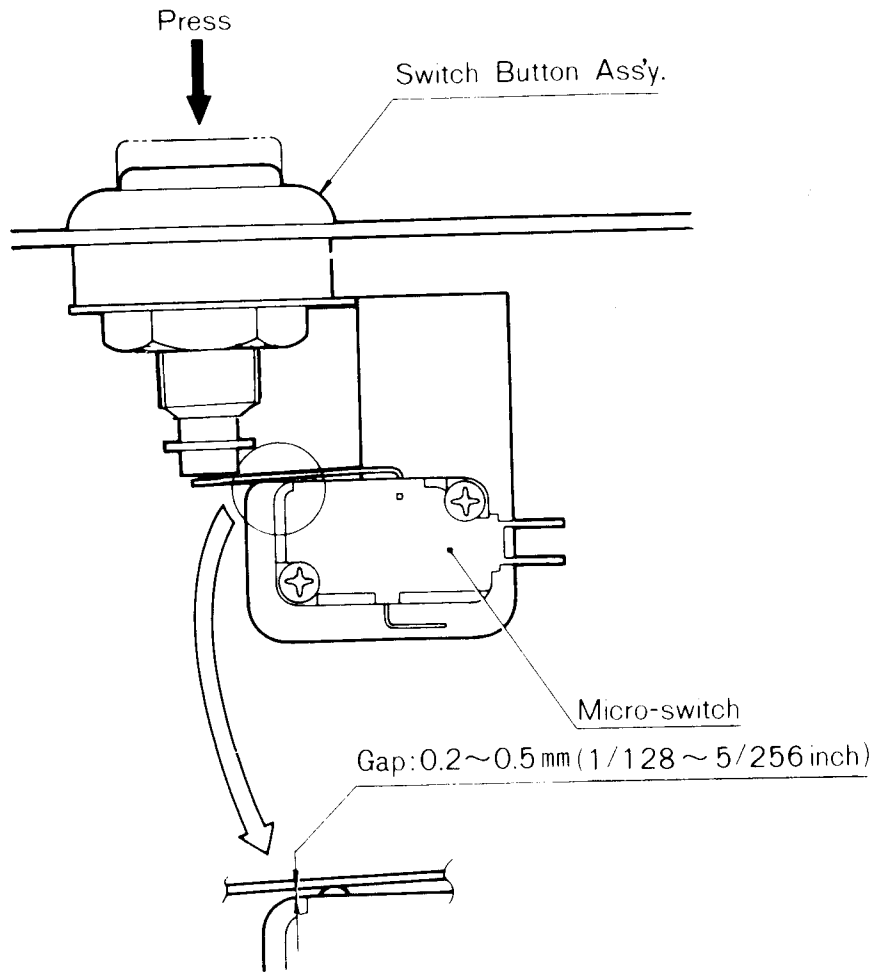


Fig. 9 Switch gap adjustment

(3) Lubrication for 4 way Controller

To maintain the 4 way Controller in good condition, lubricate the pillow balls and 4 way Guide Plate approx. every 3 months. See Fig. 10.

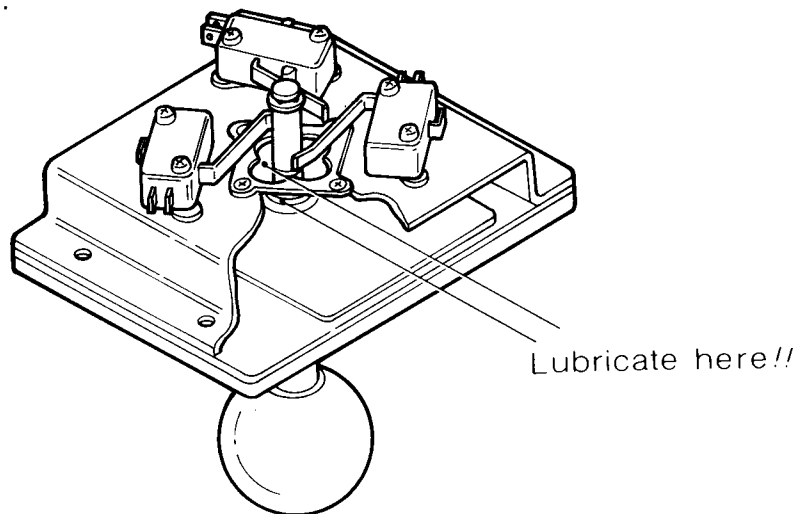


Fig. 10 Lubrication points

## D. Video Monitor Removal

### (1) Front Screen Removal

First remove the Operation Panel and then pull the Front Screen toward you.

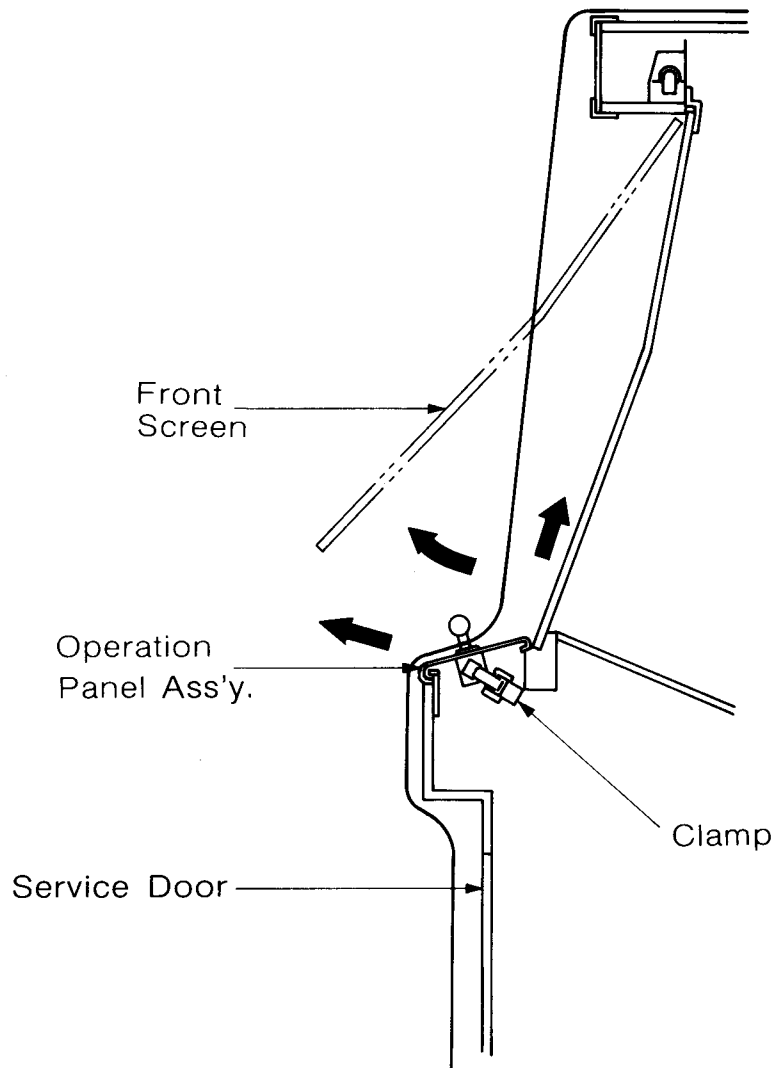


Fig. 11 Front Screen and  
Operation Panel Ass'y. Removal

## (2) Video Monitor Removal

If you need to remove the Video Monitor, follow the instructions listed below. But the following procedure should only be performed by an experienced service technician.

### WARNING

It is recommended the game be left unplugged for at least one hour before removing the Video Monitor. This will probably discharge the CRT, but extreme caution is still necessary.

- (a) Make sure game is unplugged !!
- (b) Open the Rear Door Panel and remove the Front Screen.
- (c) Unplug all the harnesses and cables from the Video Monitor.
- (d) Standing at the front opening of the game, remove the four mounting bolts and flat washers. See Fig. 12.
- (e) Carefully lift the Video Monitor and pull toward you.

### WARNING

Use extreme caution and do not touch electrical parts of the yoke area with your hands or with any metal object in your hands.

Remove the four mounting bolts and flat washers

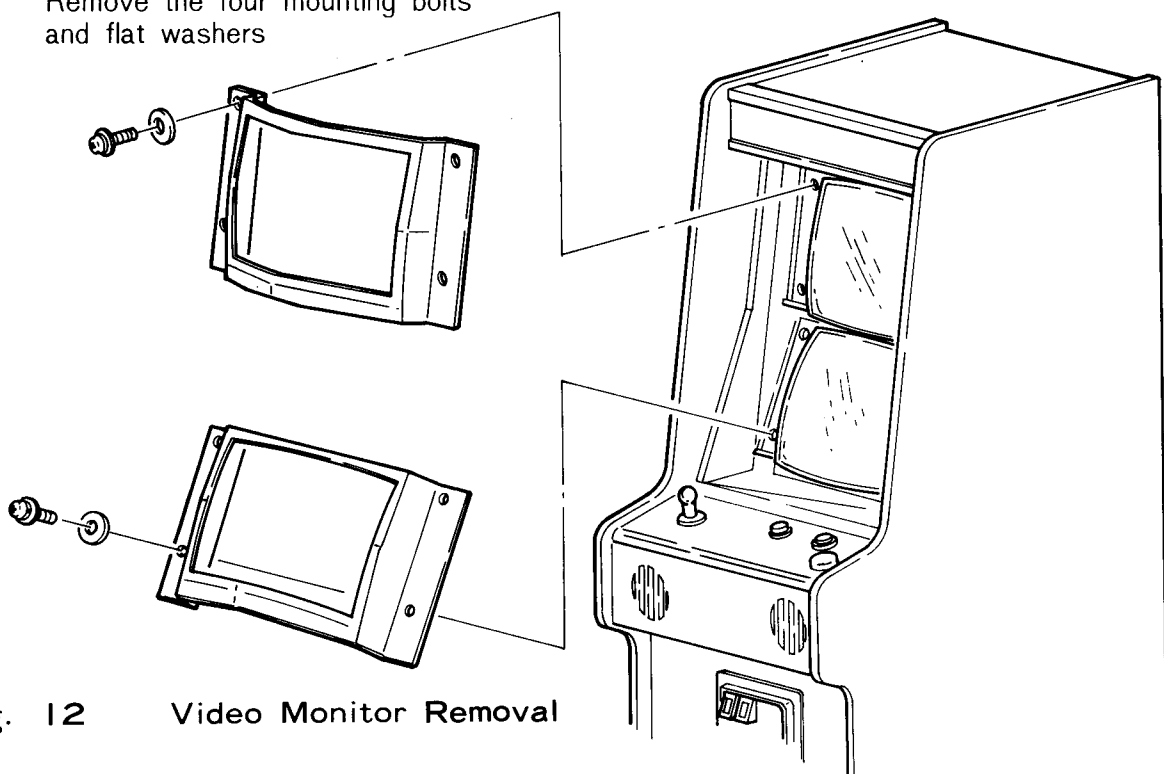


Fig. 12 Video Monitor Removal

## E. Game PCB Removal

- (a) Make sure the game is unplugged !!
- (b) Open the Rear Door Panel.
- (c) Remove the 56-pin edge connector from the right side of the 054-FCC PCB on the 054 Shield Cover.
- (d) Pull out 6 Fasteners located on perimeter of the 054 Shield Cover. See Fig 13.
- (e) Remove the Game PCB from the 054 Shield Cage by carefully sliding it straight out of the wooden PCB retainer.
- (f) Pull out 2 Fasteners at the center of the 054 Shield Cover. The Game PCB can be removed now. See Fig 13.

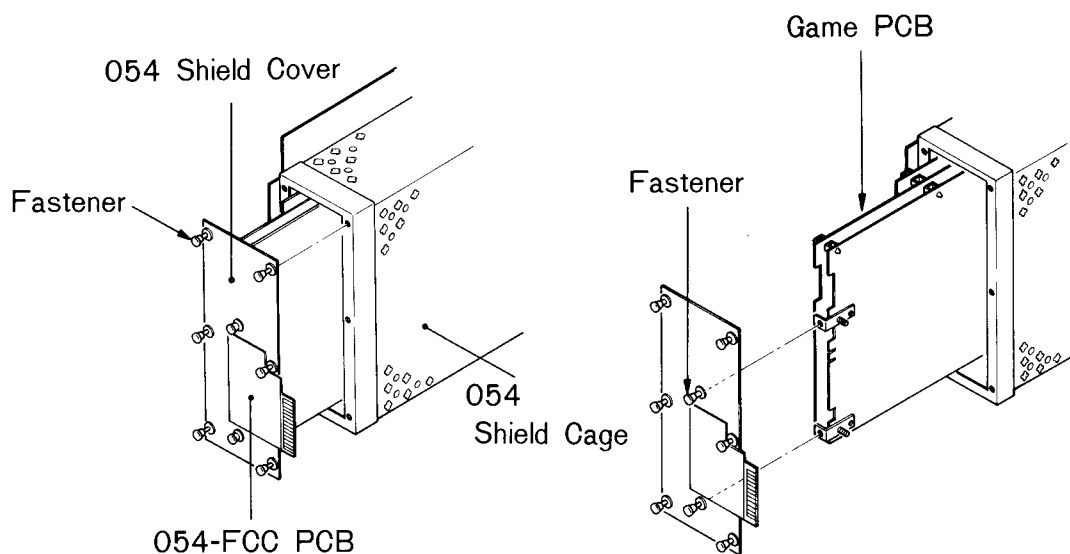


Fig. 13 Game PCB Removal

### WARNING

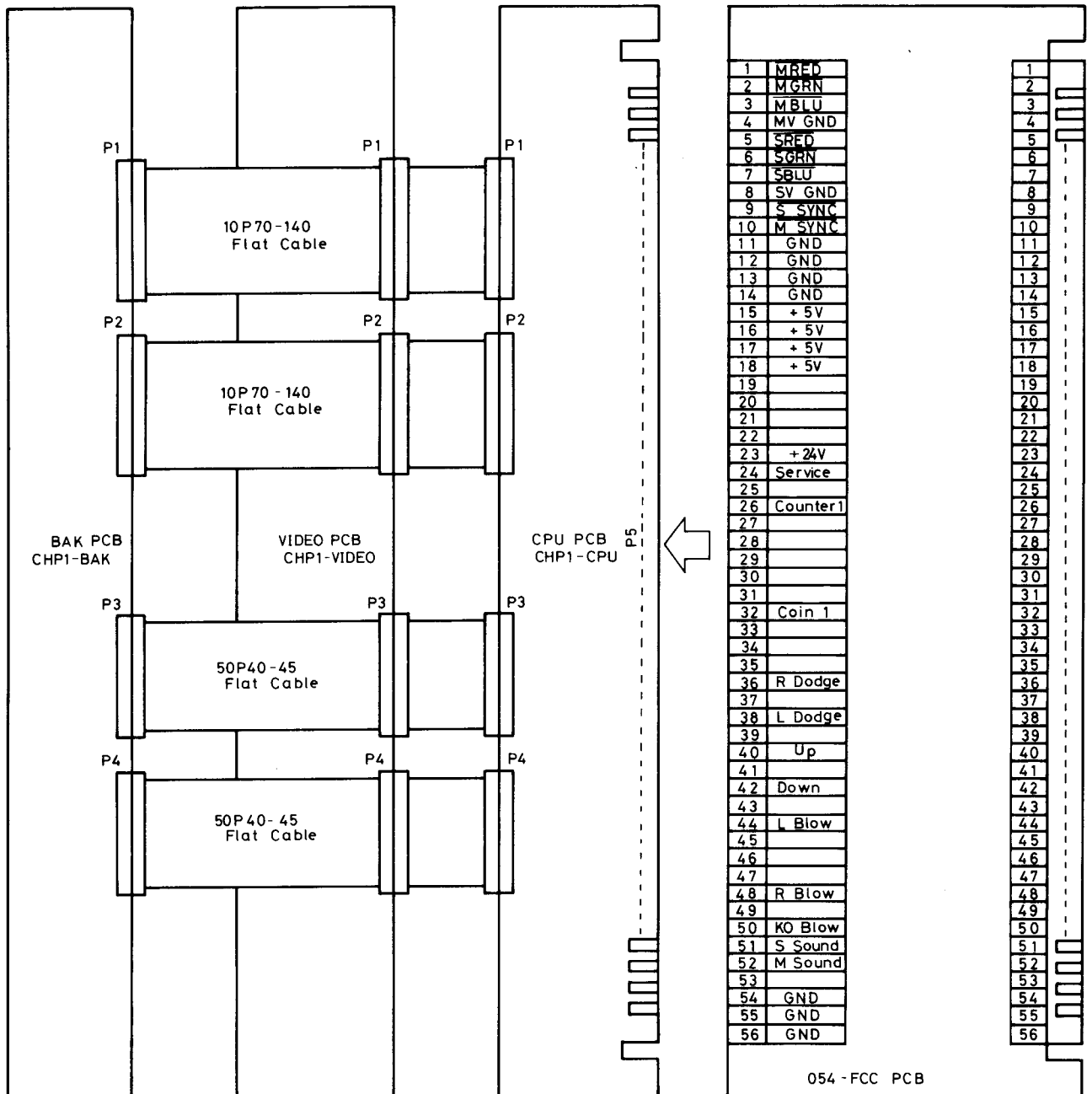
A reversed connector will damage your PCB !  
If the connectors don't slip on easily, don't force them !

## 5. Radio Frequency Interference (RFI)

In order to protect against the RFI radiated from this equipment, please comply with the following.

- (a) Do not use non-Nintendo parts !
- (b) Do not modify your game circuitry !
- (c) Do not modify the wiring harness and connections !
- (d) Connect this game only to a grounded 3-wire outlet.
- (e) After servicing the Game PCB, shut the 054 Shield Cover completely with the Fasteners. See Fig 13.

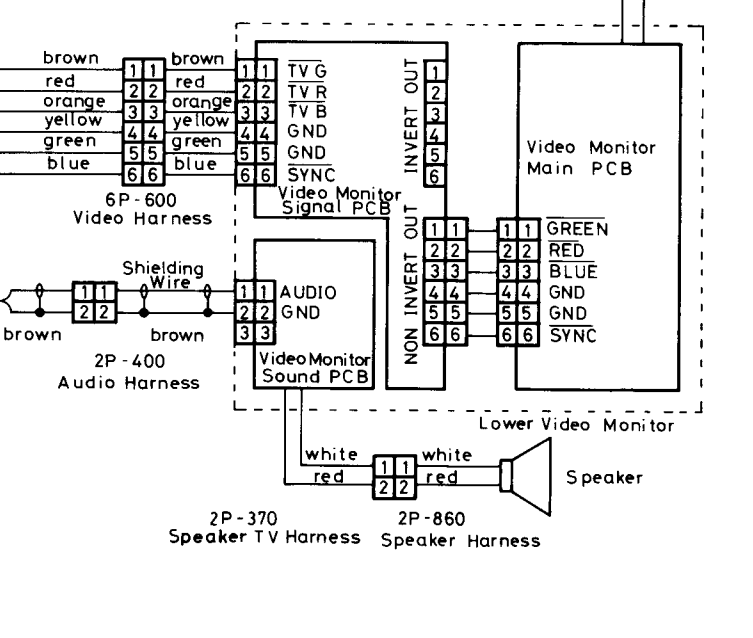
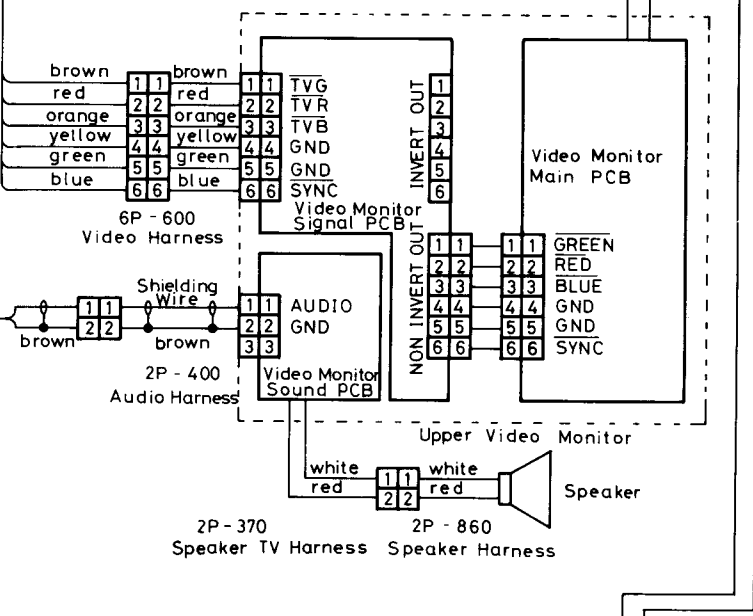
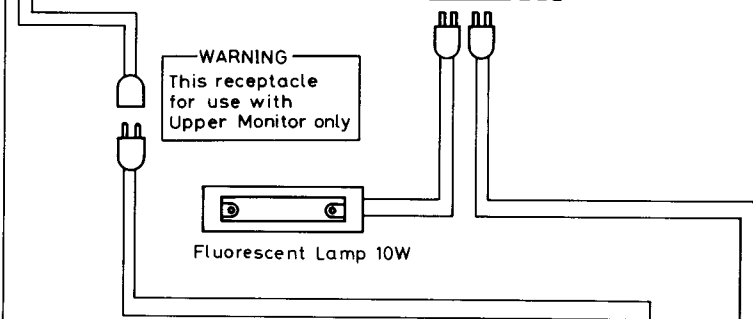
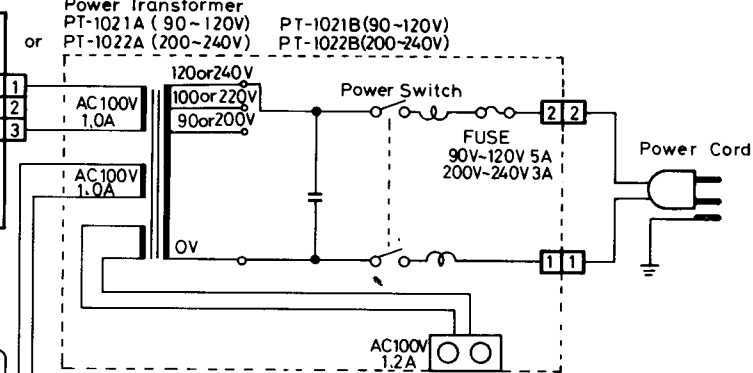
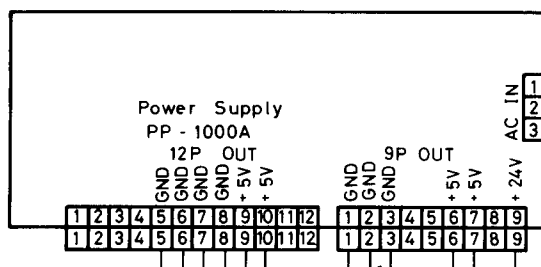
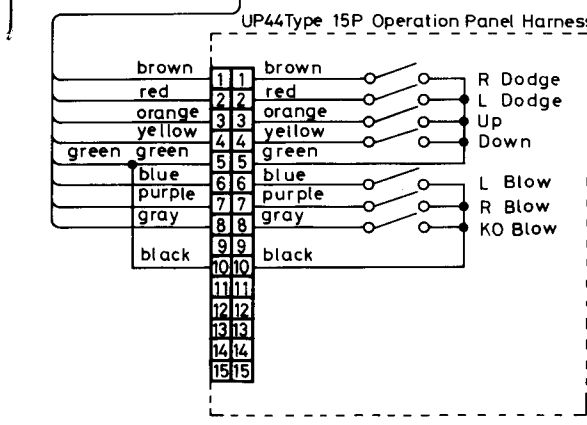
Fig. 14 Wiring and Connection





UP 56P Edge Connecting Harness

1	MRED	red
2	MGRN	brown
3	MBLU	orange
4	MV GND	yellow
5	SRED	red
6	SGRN	brown
7	SBLU	orange
8	SV GND	yellow
9	S SYNC	green
10	M SYNC	blue
11	GND	blue
12	GND	
13	GND	
14	GND	
15	+ 5V	
16	+ 5V	
17	+ 5V	
18	+ 5V	
19		
20		
21		
22		
23	+ 24V	
24	Service	
25		
26	Counter 1	
27		
28		
29		
30		
31	Coin 2	
32	Coin 1	
33		
34		
35		
36	R Dodge	brown
37	L Dodge	red
38	Up	orange
39	Down	yellow
40		
41		
42	L Blow	blue
43		
44		
45		
46		
47	R Blow	purple
48		
49	KO Blow	gray
50		
51	S Sound	
52	M Sound	
53		
54	GND	green
55	GND	
56	GND	



# 7. Name and Location of each part and Parts List

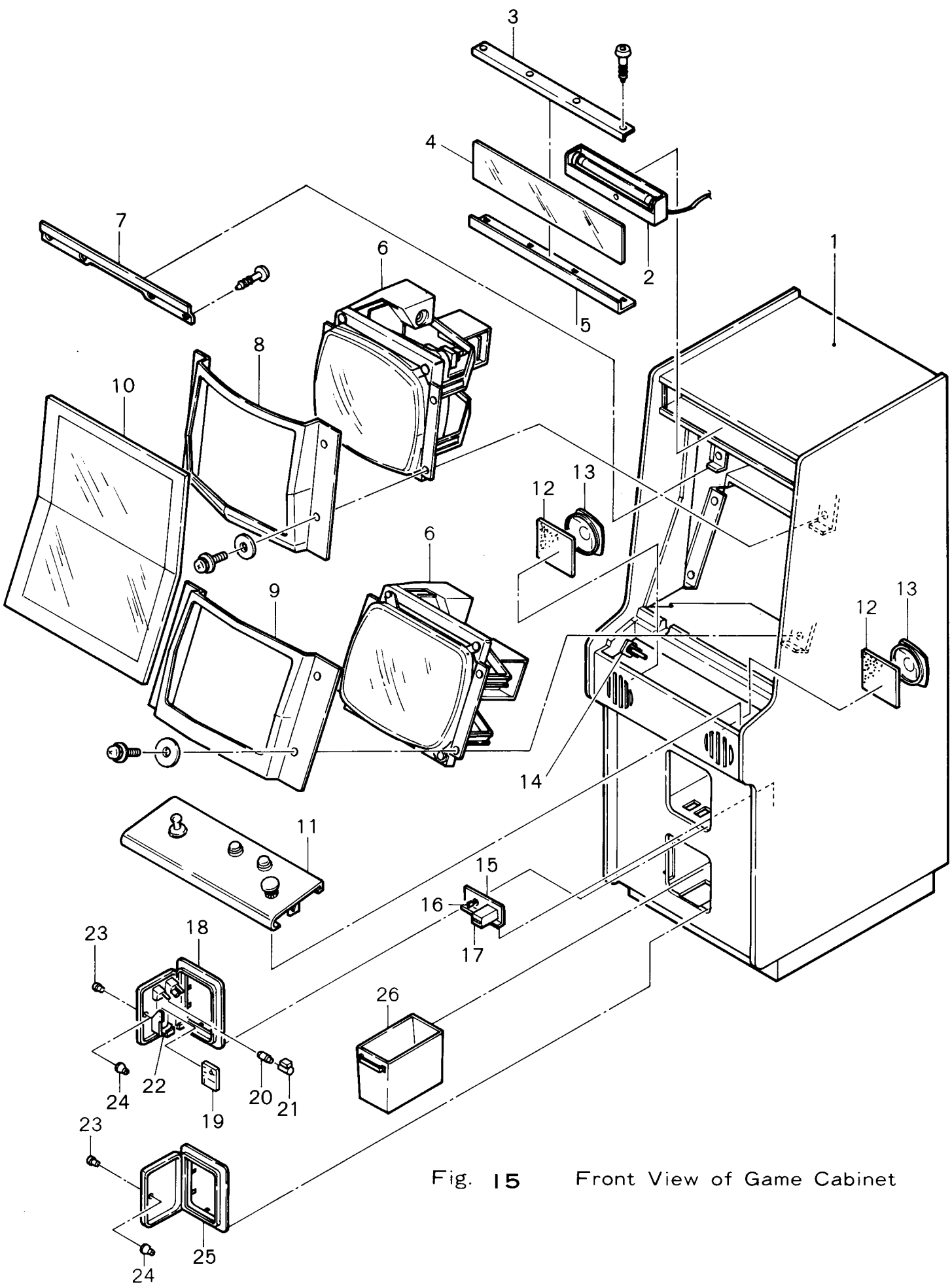


Fig. 15 Front View of Game Cabinet

ITEM	PART No.	DESCRIPTION
1	CHPU-13-03	Body (Wooden Game Cabinet)
2	TKGU-01-29	Fluorescent Lamp Ass'y.
3	CHPU-11-19	Name Plate Retainer Upper 598L
4	CHPU-12-12	CHP-US Display Panel (Name Plate)
5	CHPU-11-11	Name Plate Retainer Lower 598L
6	TPPU-20-00	Video Monitor [32 Type] 20-EZV (R-C)
	or TKGU-20-00	Video Monitor [31 Type] 20-EZV (R-B)
7	CHPU-11-10	Front Screen Retainer 598L
8	CHPU-13-01	054 Black Cardboard Bezel Upper
9	CHPU-13-02	054 Black Cardboard Bezel Lower
10	CHPU-12-13	CHP-US Front Screen
11	CHPU-12-11	CHP-US Operation Panel (Panel Only)
12	TKGU-01-49	Speaker Grill
13	TKGU-01-43	Speaker
14	TKGU-01-31	Operation Panel Clamp A (2 Required)
15	TMAU-11-20	CS Plate 120W
16	TKGU-01-33	Service Switch (with Button)
17	TKGU-01-11	Game Counter
18	TMAU-14-17	Service Door ADD-S2: Order By Currency
19	TMAU-14-18	Coin Selector: Order By Currency
20	TMAU-34-17	Lamp BA-9S 6.3V 0.15A
21	TMAU-34-16	Lamp Socket BA-9S
22	TMAU-34-19	Micro-switch ADD D2MC-5F1
23	TMAU-14-12	Door Lock
24	TMAU-11-14	Cam B31R
25	TMAU-14-11	Cash Door ADD
26	TMAU-11-27	Cash Box ADD



**PARTS LIST: CHP 1-UP Game Cabinet Assembly**

ITEM	PART No.	DESCRIPTION
1	TKGU-01-61	Vent Grill (2 Required)
2	CHPU-13-15	Rear Door Panel
3	TMAU-14-14	Lock K6510
4	TMAU-11-15	Cam A
5	CHPU-11-18	PCB Stopper (2 Required)
6	CHPU-22-01	CHP1-VIDEO Complete PCB Assembly
7	CHPU-21-01	CHP1-CPU Complete PCB Assembly
8	CHPU-24-01	CHP1-BAK Complete PCB Assembly
9	CHPU-01-01-11	054 Shield Cover
10	CHPU-23-01	054-FCC Complete PCB Assembly
11	CHPU-11-17	054 Shield Spacer (2 Required)
12	CHPU-23-35	Nylatch Fastener (8 Required)
13	CHPU-23-34	Nylatch Grommet (8 Required)
14	CHPU-01-19	PCB Support CBSS-12N (10 Required)
15	CHPU-01-20	PCB Support CBSS-8N (4 Required)
16	TKGU-01-08	Power Cord: Order By Voltage & Plug Type
17	CHPU-88-01	PP-1000A Complete Power Supply Assembly
18	CHPU-08-01	PT-1021A Power Transformer (For 90~120V)
18	CHPU-18-01	PT-1021B Power Transformer (For 90~120V)
18	CHPU-18-02	PT-1022B Power Transformer (For 200~240V)
19	TKGU-01-30	Caster (2 Required)
20	CHPU-01-01-10	054 Shield Cage
21	TKGU-01-65	Strain Relief Bushing Plate
22	TKGU-01-10	Strain Relief Bushing

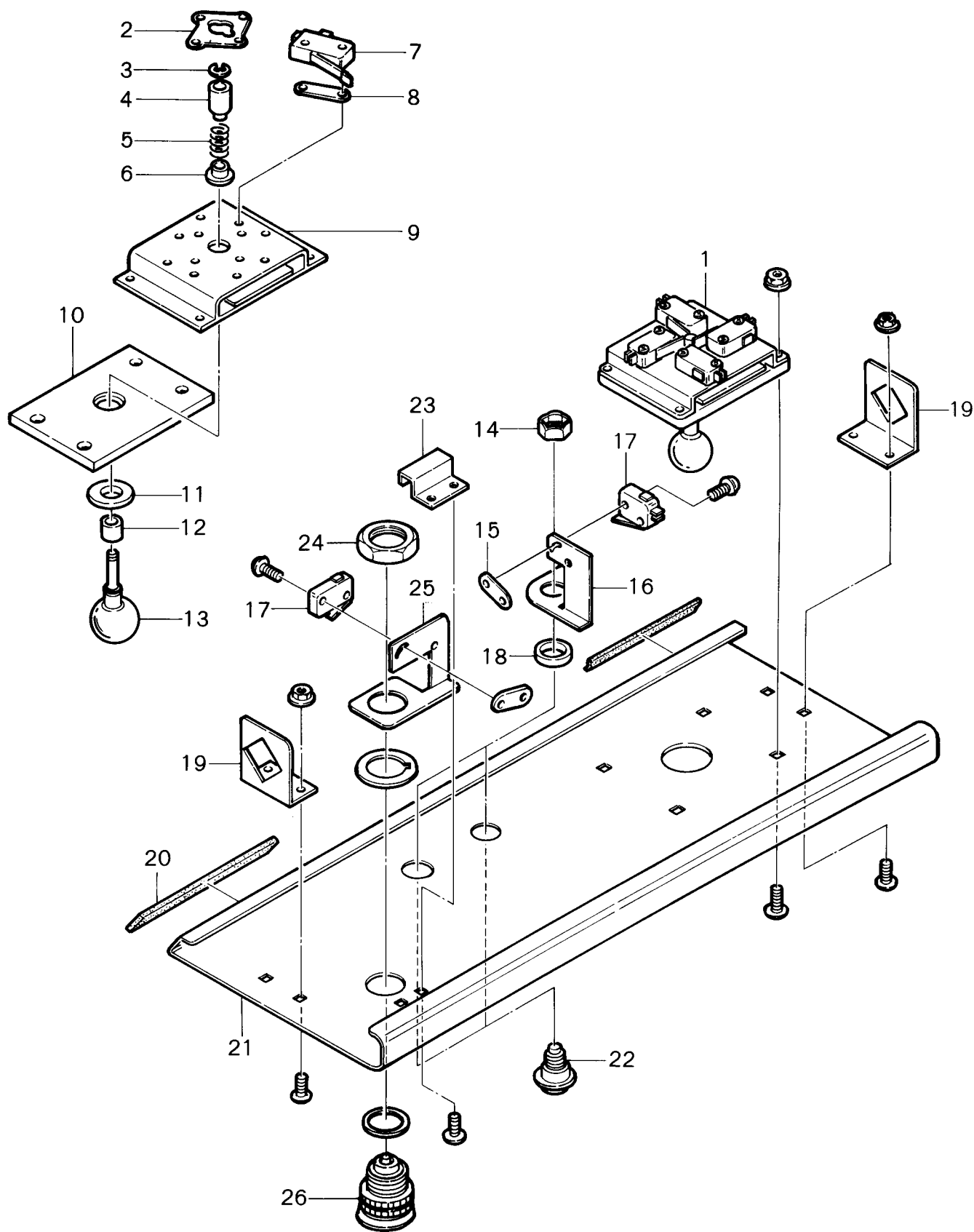


Fig. 17 Operation Panel Assembly

## PARTS LIST: CHP1-UP Operation Panel Assembly

ITEM	PART No.	DESCRIPTION
1	DKCU-14-11	Complete 4 way Controller Ass'y.
2	TKGU-23-51	4 way Guide Plate
3	TKGU-23-23	E Ring 4
4	TKGU-23-21	Switch Collar
5	TKGU-23-22	Lever Spring
6	TKGU-23-20	Spring Stopper
7	TKGU-23-13	Micro-switch VL12L (Bent) (4 Required)
8	TKGU-23-17	Switch Spacer (4 Required)
9	TKGU-23-16	Bearing Bracket
10	TMAU-12-15	Lever Plate
11	TMAU-12-14	Control Knob Plate 28D
12	TMAU-12-16	Controller Knob Collar 8L
13	TMAU-11-18	Knob with Shaft 80.5L
14	TKGU-23-34	Pal Nut (2 Required)
15	TKGU-23-26	Nut Plate (3 Required)
16	TKGU-23-12	Switch Button Bracket (2 Required)
17	TMAU-34-18	Micro-switch VL12L (Straight) (3 Required)
18	TMAU-12-18	Collar 34×28×7H (2 Required)
19	TMAU-11-19	Operation Panel Fastener B 38W
20	CHPU-12-17	Black Sponge 2×10×590L
21	CHPU-12-11	CHP-US Operation Panel
22	TKGU-23-32	Orange Button Ass'y. (2 Required)
23	CHPU-11-14	Button Stopper
24	CHPU-11-15	Nut M30 P2
25	CHPU-11-16	Switch Button Bracket Large
26	CHPU-23-33	Button ZAP-2A Ass'y. (Include Al Ring and Rubber Ring)

## PARTS LIST: CHP1-UP Wiring Harness

PART No.	DESCRIPTION	See Fig. 14
CHPU-41-16	UP 56P-054 Edge Connecting Harness	
TPPU-93-02	2P-400 Audio Harness (400mm)	(2 Required)
TPPU-93-07	6P-600 Video Harness (600mm)	(2 Required)
TMAU-41-12	3P-500 Game Counter Harness (500mm)	
CHPU-41-13	4P-800 Service Switch Harness (800mm)	
TMAU-41-14	4P-600 WL Coin Harness (600mm)	
TKGU-13-06	2P Speaker TV Harness [2P-370] (370mm)	
TKGU-13-17	2P Speaker Harness [2P-860] (860mm)	
CHPU-41-11	UP 44 Type 15P Operation Panel Harness	
CHPU-93-12	50P 40-45 Flat Cable	(2 Required)
CHPU-93-11	10P 70-140 Flat Cable	(2 Required)

No.	DESCRIPTION(Reference Designations and Locations)
CHPU-21-01	CHP1-CPU Complete PCB Assembly
CHPU-21-11	Z80A Microprocessor (6H)
CHPU-21-12	VLM5030 Speech Synthesizer (6M)
CHPU-21-13	RP2A03 Microprocessor (4H)
CHPU-21-15	2764 8K-Byte EP-ROM 250ns CHP1-C-4K (4K)
CHPU-21-16	2764 8K-Byte EP-ROM 300ns CHP1-C-8H (8H)
CHPU-21-17	2764 8K-Byte EP-ROM 300ns CHP1-C-8J (8J)
CHPU-21-18	2764 8K-Byte EP-ROM 300ns CHP1-C-8K (8K)
CHPU-21-19	2764 8K-Byte EP-ROM 300ns CHP1-C-8L (8L)
CHPU-21-20	27128 16K-Byte EP-ROM 300ns CHP1-C-6P (6P)
CHPU-21-21	27128 16K-Byte EP-ROM 300ns CHP1-C-8F (8F)
CHPU-21-22	HM6116AP-15 2K-Byte RAM 150ns (4L)
CHPU-21-23	TC5533P-A 4K-Byte RAM 150ns (8D)
CHPU-21-24	HM6264P-15 8K-Byte RAM 150ns (8C)
CHPU-21-25	TC5514AP-3 1Kx4-Bit C-MOS RAM 300ns (8M)
CHPU-21-26	74LS00 Quad 2-Input NAND (3B)
CHPU-21-27	74LS02 Quad 2-Input NOR (3A)
CHPU-21-28	74LS04 Hex Inverters (4B, 3C, 6D, 6E)
CHPU-21-29	74LS08 Quad 2-Input AND (5D)
CHPU-21-30	74LS14 Hex Schmitt Inverters (1C)
CHPU-21-31	74LS74A Dual "D" Flip-Flops (P, CL) (1D, 1F)
CHPU-21-32	74LS92 Divide-By-Twelve Counter (5L)
CHPU-21-33	74LS109A Dual J-K Flip-Flops (PLE, CL) (5F)
CHPU-21-34	74LS138 3 To 8 Decoder (2C, 2D, 7D)
CHPU-21-35	74LS139 Dual 2 To 4 Decoders (7E, 8A)
CHPU-21-36	74LS161A 4-Bit Binary Counters (2A, 5A, 5B, 6B, 7B)
CHPU-21-37	74LS194A 4-Bit Shift Registers (4A)
CHPU-21-38	74LS240 Octal Buffers (TS) (1R, 2R, 5R, 6R)
CHPU-21-39	74LS245 Octal Bus Transceivers (7F)
CHPU-21-40	74LS259 8-Bit Addressable Latches (2B)
CHPU-21-41	74LS365 Hex Bus Drivers (5C, 6C, 7C)
CHPU-21-42	74LS367 Hex Bus Drivers (6F, 6K, 7K)
CHPU-21-43	74LS374 Octal "D" Flip-Flops (1A,6A,7A,2E,2F,2H,2J,6L)
CHPU-21-44	74S04 Hex Inverters (5K)
CHPU-21-45	7437 Quad 2-Input NAND Buffers (5H)
CHPU-21-46	75471 Dual Peripheral AND Drivers (3S)
CHPU-21-47	74HC20 Dual 4-Input NAND (8N)
CHPU-21-48	PST518A Low Voltage Detector (3L)
CHPU-21-49	LM324 Quad Operational Amplifiers (2N)
CHPU-21-50	2SC1815 Silicon NPN Transistor (Q1~Q3)
CHPU-21-108	2SC2235 Silicon NPN Transistor (Q4)
CHPU-21-51	ES1F Diode (D1)
CHPU-21-52	1S5277B Diode (D2, D3)
CHPU-21-53	1S2076 Diode (D4~D7)



No.	DESCRIPTION (Reference Designations and Locations)	
CHPU-21-54	DAN401 Quad Cathode-Common Diode Array (DA1, DA2, DA3, DA4)	
CHPU-21-55	330 pf 50V $\pm 5\%$ Styrol Capacitor	(C36, C41)
CHPU-21-56	0.01 uf 50V $\pm 10\%$ Mylar Capacitor	(C34, C39)
CHPU-21-57	0.015 uf 50V $\pm 10\%$ Mylar Capacitor	(C35, C40)
CHPU-21-109	68 pf 50V Ceramic-Disc Capacitor	(C52, C53)
CHPU-21-58	180 pf 50V Ceramic-Disc Capacitor	(C30)
CHPU-21-59	220 pf 50V Ceramic-Disc Capacitor	(C44, C45)
CHPU-21-60	330 pf 50V Ceramic-Disc Capacitor	(C2, C46, C47, C51)
CHPU-21-61	1000 pf 50V Ceramic-Disc Capacitor	(C1)
CHPU-21-62	0.01 uf 50V Ceramic-Disc Capacitor	(C80 ~ C150)
CHPU-21-63	0.068 uf 50V Ceramic-Disc Capacitor	(C7, C8, C9)
CHPU-21-64	1 uf 16V Al Electrolytic Radial Cap.	(C3, C4, C31, C32, C37, C42)
CHPU-21-65	3.3 uf 16V Al Electrolytic Radial Cap.	(C5, C6)
CHPU-21-66	10 uf 16V Al Electrolytic Radial Cap.	(C33, C38)
CHPU-21-67	33 uf 16V Al Electrolytic Axial Cap.	(C43)
CHPU-21-68	220 uf 16V Al Electrolytic Axial Cap.	(C50)
CHPU-21-69	0 Ohm Shunt Lead	(R18, R19)
All discrete R are Carbon Resistors		
CHPU-21-70	10 Ohm 1/4W $\pm 5\%$ Resistor	(R6)
CHPU-21-71	51 Ohm 1/4W $\pm 5\%$ Resistor	(R14, R92)
CHPU-21-72	100 Ohm 1/4W $\pm 5\%$ Resistor	(R32, R33, R36, R37)
CHPU-21-73	110 Ohm 1/4W $\pm 5\%$ Resistor	(R3)
CHPU-21-74	180 Ohm 1/4W $\pm 5\%$ Resistor	(R61, R68)
CHPU-21-75	330 Ohm 1/4W $\pm 5\%$ Resistor	(R30, R31)
CHPU-21-76	820 Ohm 1/4W $\pm 5\%$ Resistor	(R1, R2, R64, R65)
CHPU-21-77	1K Ohm 1/4W $\pm 5\%$ Resistor	(R9, R62, R69, R80 ~ R86, R88, R90, R91)
CHPU-21-78	2.4K Ohm 1/4W $\pm 5\%$ Resistor	(R49)
CHPU-21-79	3.3K Ohm 1/4W $\pm 5\%$ Resistor	(R15, R16, R47)
CHPU-21-80	5.1K Ohm 1/4W $\pm 5\%$ Resistor	(R4, R7, R8, R17, R87)
CHPU-21-81	8.2K Ohm 1/4W $\pm 5\%$ Resistor	(R57)
CHPU-21-82	10K Ohm 1/4W $\pm 5\%$ Resistor	(R43, R51, R55)
CHPU-21-83	12K Ohm 1/4W $\pm 5\%$ Resistor	(R35, R39, R52)
CHPU-21-85	20K Ohm 1/4W $\pm 5\%$ Resistor	(R5, R34, R38)
CHPU-21-86	30K Ohm 1/4W $\pm 5\%$ Resistor	(R48)
CHPU-21-87	43K Ohm 1/4W $\pm 5\%$ Resistor	(R60, R67)
CHPU-21-88	75K Ohm 1/4W $\pm 5\%$ Resistor	(R44)
CHPU-21-89	100K Ohm 1/4W $\pm 5\%$ Resistor	(R45, R46, R53, R54, R56)
CHPU-21-110	110K Ohm 1/4W $\pm 5\%$ Resistor	(R59, R66)
CHPU-21-90	150K Ohm 1/4W $\pm 5\%$ Resistor	(R70, R71)
CHPU-21-91	200K Ohm 1/4W $\pm 5\%$ Resistor	(R10 ~ R13)
CHPU-21-92	Hex 5.1K Ohm Series Resistor Array	(RM5)
CHPU-21-93	Octal 1K Ohm Series Resistor Array	(RM1 ~ RM4)
CHPU-21-94	Quad 68 Ohm Parallel Resistor Array	(RM6 ~ RM9)
CHPU-21-95	8 MHz Crystal	(X1)
CHPU-21-96	21.47727 MHz Crystal	(X2)

No.	DESCRIPTION(Reference Designations and Locations)
CHPU-21-97	4-Station, Single-Throw, DIP Bit Switch (SW1)
CHPU-21-98	8-Station, Single-Throw, DIP Bit Switch (SW2)
CHPU-21-111	24 Pin DIP IC Socket (S13)
CHPU-21-99	28 Pin DIP IC Socket (S5~S12)
CHPU-21-100	40 Pin DIP IC Socket (S1~S4)
CHPU-21-101	10 Pin Connector Receptacle (P1, P2)
CHPU-21-102	50 Pin Flat Cable Header (P3, P4)
CHPU-21-103	Battery Case TYPE33-3 (UM-3x3)
CHPU-21-104	Flat Head Screw M2.6x8
CHPU-21-105	Nut Plate M2.6-P30 (2 per assembly)
CHPU-21-106	Wire Tie T18L
CHPU-21-107	Dry Battery UM-3 ( "AA" Dry Cell) (3 per assembly)

**PARTS LIST : CHP1-VIDEO PCB Assembly**

**Continued**

No.	DESCRIPTION (Reference Designations and Locations)
CHPU-22-01	CHP1-VIDEO Complete PCB Assembly
CHPU-22-59	2564 8K-Byte EP-ROM 450ns CHP1-V-6N (6N)
CHPU-22-60	2564 8K-Byte EP-ROM 450ns CHP1-V-8N (8N)
CHPU-22-61	2564 8K-Byte EP-ROM 450ns CHP1-V-6P (6P)
CHPU-22-62	2564 8K-Byte EP-ROM 450ns CHP1-V-8P (8P)
CHPU-22-19	27128 16K-Byte EP-ROM 300ns CHP1-V-2R (2R)
CHPU-22-20	27128 16K-Byte EP-ROM 300ns CHP1-V-3R (3R)
CHPU-22-21	27128 16K-Byte EP-ROM 300ns CHP1-V-4R (4R)
CHPU-22-22	27128 16K-Byte EP-ROM 300ns CHP1-V-2T (2T)
CHPU-22-23	27128 16K-Byte EP-ROM 300ns CHP1-V-3T (3T)
CHPU-22-24	27128 16K-Byte EP-ROM 300ns CHP1-V-4T (4T)
CHPU-22-25	2764 8K-Byte EP-ROM 300ns CHP1-V-2U (2U)
CHPU-22-26	2764 8K-Byte EP-ROM 300ns CHP1-V-3U (3U)
CHPU-22-27	2764 8K-Byte EP-ROM 300ns CHP1-V-4U (4U)
CHPU-22-28	2764 8K-Byte EP-ROM 300ns CHP1-V-2V (2V)
CHPU-22-29	2764 8K-Byte EP-ROM 300ns CHP1-V-3V (3V)
CHPU-22-30	N82S129N 256x4-Bit Bipolar ROM CHP1-V-2D (2D)
CHPU-22-31	HM6116ASP-15 2K-Byte RAM 150ns (8H, 2N)
CHPU-21-26	74LS00 Quad 2-Input NAND (1E, 6S, 5L)
CHPU-21-28	74LS04 Hex Inverters (6C, 4D, 4E, 6E, 1J, 6T)
CHPU-22-32	74LS10 Tripple 3-Input NAND (6U)
CHPU-22-33	74LS11 Tripple 3-Input AND (8D, 6V)
CHPU-22-34	74LS20 Dual 4-Input NAND (7V)
CHPU-22-35	74LS21 Dual 4-Input AND (1K)
CHPU-21-31	74LS74A Dual "D" Flip-Flops (P, CL) (3D, 6R, 7S, 7T, 7U)

No.	DESCRIPTION (Reference Designations and Locations)
CHPU-22-36	74LS86 Quad 2-Input Exclusive OR (7D, 1H, 5P, 1S)
CHPU-21-34	74LS138 3 To 8 Decoder (5B, 5E, 1R)
CHPU-21-35	74LS139 Dual 2 To 4 Decoders (5F, 6J)
CHPU-22-37	74LS151 8 To 1 Line Data Selector (1U, 1W, 4W)
CHPU-22-38	74LS153 Dual 4 To 1 Data Selectors (5C, 5D)
CHPU-22-39	74LS157 Quad 2 To 1 Line Multiplexers(4P, 7F, 8F, 6H, 4N, 5N, 7R)
CHPU-21-36	74LS161A 4-Bit Binary Counters (2A, 7C, 8C, 6D, 2E, 3E, 7E, 8E, 6F, 3M, 4M, 5M, 8T, 8U)
CHPU-22-41	74LS164 8-Bit Shift Registers (5J, 5K, 2L, 2M)
CHPU-22-42	74LS174 Hex "D" Flip-Flops (3L, 4L)
CHPU-22-43	74LS175 Quad "D" Flip-Flops (CL) (2C)
CHPU-22-44	74LS244 Octal Buffers & Line Drivers (TS) (3N, 3P, 5H)
CHPU-22-45	74LS273 Octal "D" Flip-Flops (CL) (7H, 8J, 1N, 1P, 2P)
CHPU-22-46	74LS283 4-Bit Full Adder (2K, 3K, 4K)
CHPU-22-47	74LS299 8-Bit Shift/Storage Registers (8R, 8S)
CHPU-21-42	74LS367 Hex Bus Drivers (2B, 5W)
CHPU-22-48	74LS373 Octal "D" Transparent Latches(3A, 3B, 7B, 8B, 3C)
CHPU-21-43	74LS374 Octal "D" Flip-Flops (8V)
CHPU-22-49	74LS375 4-Bit Bistable Latches (4A, 5A, 4B, 6B, 4C)
CHPU-22-50	74LS377 Octal "D" Flip-Flops (7J, 1T, 1V, 4V)
CHPU-21-44	74S04 Hex Inverters (1B)
CHPU-22-51	74F04 Hex Inverters (1C)
CHPU-22-52	74F74 Dual "D" Flip-Flops (P, CL) (1D, 4H)
CHPU-22-53	74F161 4-Bit Binary Counters (1F, 2F, 3F, 4F)
CHPU-22-54	74F174 Hex "D" Flip-Flops (2H, 3H)
CHPU-22-55	74F283 4-Bit Full Adder (2J, 3J, 4J)
CHPU-21-51	ES1F Diode (D1)
CHPU-22-56	100 pf 50V Ceramic-Disc Capacitor (C10, C11, C12, C13)
CHPU-21-58	180 pf 50V Ceramic-Disc Capacitor (C1)
CHPU-21-60	330 pf 50V Ceramic-Disc Capacitor (C2, C3, C4, C15)
CHPU-21-61	1000 pf 50V Ceramic-Disc Capacitor (C14)
CHPU-21-62	0.01 uf 50V Ceramic-Disc Capacitor (C20~C138)
CHPU-21-68	220 uf 16V Al Electrolytic Axial Cap. (C5)
All discrete R are Carbon Resistors	
CHPU-21-75	330 Ohm 1/4W $\pm 5\%$ Resistor (R1, R2)
CHPU-21-77	1K Ohm 1/4W $\pm 5\%$ Resistor (R20~R31)
CHPU-21-79	3.3K Ohm 1/4W $\pm 5\%$ Resistor (R3, R4)
CHPU-21-93	Octal 1K Ohm Series Resistor Array (RM1)
CHPU-22-57	20.160MHz Crystal (X1)
CHPU-22-58	16 Pin DIP IC Socket (S21)
CHPU-21-99	28 Pin DIP IC Socket (S1~S11, S13~S20)
CHPU-21-101	10 Pin Connector Receptacle (P1, P2)
CHPU-21-102	50 Pin Flat Cable Header (P3, P4)

No.	DESCRIPTION (Reference Designation and Locations)
CHPU-24-01	CHP1-BAK Complete PCB Assembly
CHPU-24-30	2564 8K-Byte EP-ROM 450ns CHP1-B-4A (4A)
CHPU-24-31	2564 8K-Byte EP-ROM 450ns CHP1-B-4B (4B)
CHPU-24-32	2564 8K-Byte EP-ROM 450ns CHP1-B-4C (4C)
CHPU-24-33	2564 8K-Byte EP-ROM 450ns CHP1-B-4D (4D)
CHPU-24-34	N82S131N 512x4-Bit Bipolar ROM CHP1-B-6E (6E)
CHPU-24-16	N82S131N 512x4-Bit Bipolar ROM CHP1-B-7E (7E)
CHPU-24-17	N82S131N 512x4-Bit Bipolar ROM CHP1-B-8E (8E)
CHPU-24-35	N82S131N 512x4-Bit Bipolar ROM CHP1-B-6F (6F)
CHPU-24-36	N82S131N 512x4-Bit Bipolar ROM CHP1-B-7F (7F)
CHPU-24-20	N82S131N 512x4-Bit Bipolar ROM CHP1-B-8F (8F)
CHPU-22-31	HM6116ASP-15 2K-Byte RAM 150ns (3F, 3H, 3J)
CHPU-21-26	74LS00 Quad 2-Input NAND (3B, 3C)
CHPU-21-28	74LS04 Hex Inverters (3A, 3D)
CHPU-24-21	74LS148 8 To 3 Line Priority Encoders (5H)
CHPU-22-38	74LS153 Dual 4 To 1 Data Selectors (1A, 2A)
CHPU-22-39	74LS157 Quad 2 To 1 Line Multiplexers (5E, 5F, 6J, 6K)
CHPU-21-36	74LS161A 4-Bit Binary Counters (1C, 1D, 2B, 2C, 2D)
CHPU-22-42	74LS174 Hex "D" Flip-Flops (5J)
CHPU-22-44	74LS244 Octal Buffers & Line Drivers (TS) (3K, 4J, 4K)
CHPU-24-22	74LS257 Quad 2 To 1 Line Multiplexers(1E,2E,1F,2F,1H,2H)
CHPU-22-45	74LS273 Octal "D" Flip-Flops (CL) (5K)
CHPU-22-47	74LS299 8-Bit Shift/Storage Registers (5A, 5B, 5C, 5D)
CHPU-24-23	74LS353 Dual 4 To 1 Line Multiplexers (7J,8J,7K, 8K)
CHPU-21-42	74LS367 Hex Bus Drivers (3E, 1J, 2J, 1K, 2K)
CHPU-22-50	74LS377 Octal "D" Flip-Flops (4F, 4H)
CHPU-21-50	2SC1815 Silicon NPN Transistor (Q1, Q3, Q5, Q7, Q9, Q11, Q13, Q14)
CHPU-24-25	2SA1015 Silicon PNP Transistor (Q2,Q4,Q6,Q8,Q10,Q12)
CHPU-21-51	ES1F Diode (D1)
CHPU-21-59	220 pf 50V Ceramic-Disc Capacitor (C18)
CHPU-21-62	0.01 uf 50V Ceramic-Disc Capacitor (C20~C77)
CHPU-21-67	33 uf 16V Al Electrolytic Axial Cap. (C2~C4)
CHPU-21-68	220 uf 16V Al Electrolytic Axial Cap. (C1)
CHPU-21-69	0 Ohm Shunt Lead (R60, R61)
All discrete R are Carbon Resistors	
CHPU-21-71	51 Ohm 1/4W $\pm 5\%$ Resistor (R9, R19, R29, R39, R49, R59, R66, R69)
CHPU-21-72	100 Ohm 1/4W $\pm 5\%$ Resistor (R6, R16, R26, R36, R46, R56, R64, R67)
CHPU-24-26	240 Ohm 1/4W $\pm 5\%$ Resistor (R4,R14,R24,R34,R44,R54)
CHPU-21-75	330 Ohm 1/4W $\pm 5\%$ Resistor (R7,R8,R17,R18,R27,R28,R37,R38,R47,R48,R57,R58,R65,R68)

No.	DESCRIPTION (Reference Designations and Locations)	
CHPU-24-27	470 Ohm 1/4W $\pm$ 5% Resistor (R3, R5, R13, R15, R23, R25, R33, R35, R43, R45, R53, R55)	
CHPU-21-77	1K Ohm 1/4W $\pm$ 5% Resistor (R2, R12, R22, R32, R42, R52, R80~R82, R84, R85)	
CHPU-24-28	2K Ohm 1/4W $\pm$ 5% Resistor (R1, R11, R21, R31, R41, R51, R62)	
CHPU-24-29	7.5K Ohm 1/4W $\pm$ 5% Resistor (R63)	
CHPU-22-58	16 Pin DIP IC Socket	(S5~S10)
CHPU-21-99	28 Pin DIP IC Socket	(S1~S4)
CHPU-21-101	10 Pin Connector Receptacle	(P1, P2)
CHPU-21-102	50 Pin Flat Cable Header	(P3, P4)

**PARTS LIST : 054-FCC PCB Assembly**

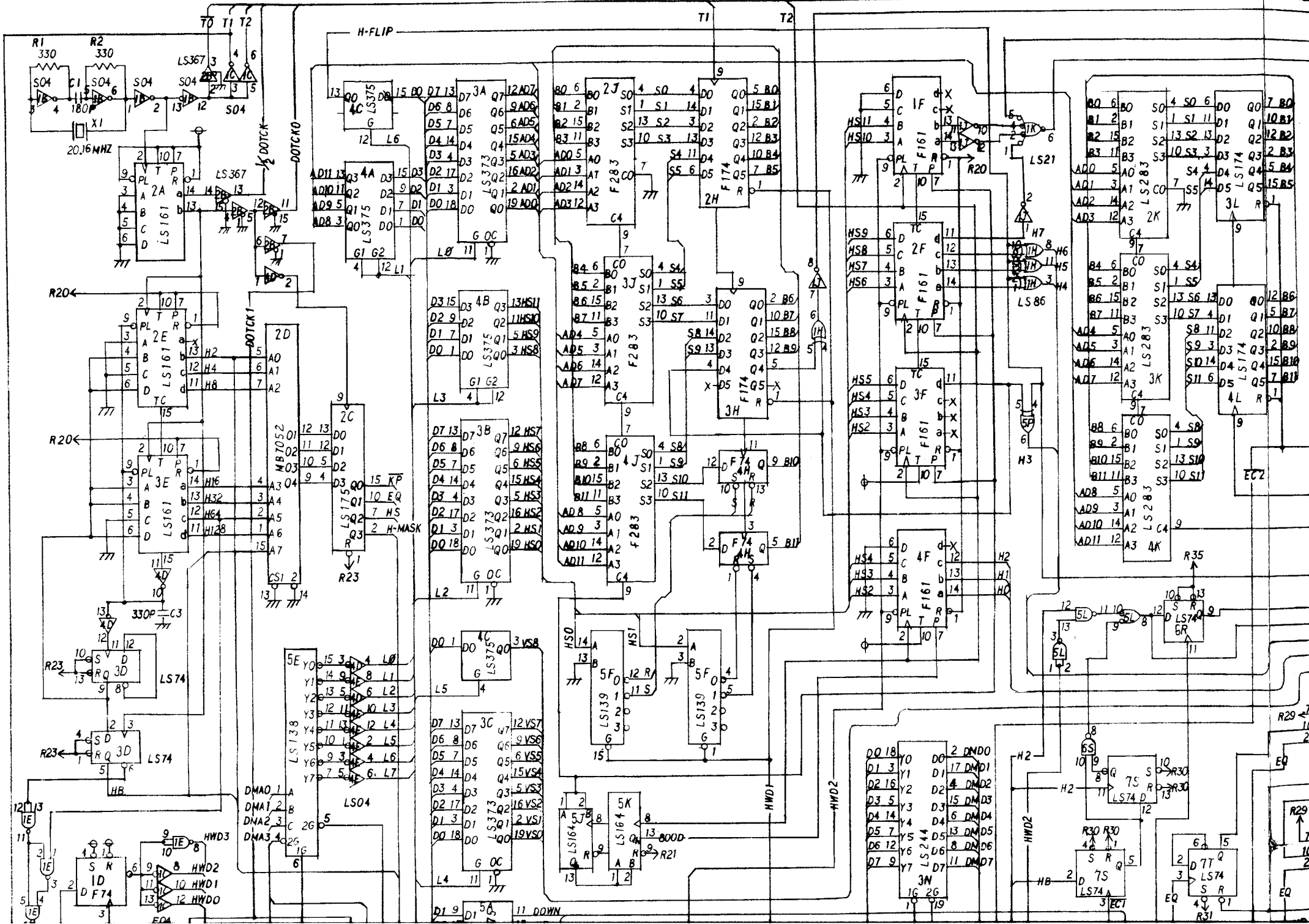
No.	DESCRIPTION (Reference Designations)	
CHPU-23-01	054-FCC Complete PCB Assembly	
CHPU-23-11	252-28-50-168 56P Edge Connector	
CHPU-23-12	330 pf 50V Ceramic-Disc Capacitor	(C1~C30)
CHPU-23-13	Ferrite Beads BL 02RN2-R62	(FC1~FC30)

No.	DESCRIPTION (Reference Designations)	
CHPU-88-01	PP-1000A Complete Power Supply Assembly	
CHPU-88-02	3D-0163 Complete Power Supply PCB Assembly	
CHPU-88-11	3D-3000 Hybrid IC	(IC1)
CHPU-88-12	uPC78M24 3-Terminal Regulator	(IC2)
CHPU-88-13	TL431CLP Adjustable Shunt Regulator	(IC3)
CHPU-88-14	TLP541G Photo Coupler	(PC1)
CHPU-88-15	PC614 Photo Coupler	(PC2)
CHPU-88-16	RB404/S4VB40 Diode	(D1)
CHPU-88-17	C25P04Q/20CS04M Diode	(D12)
CHPU-88-18	30DF2 Diode	(D11)
CHPU-88-19	1S1835/10DF6 Diode	(D6, D7, D10, D14)
CHPU-88-20	1S954 Diode	(D3)
CHPU-88-21	RD5. 1EB3 Zener Diode	(ZD1)
CHPU-88-22	5P2M Thyristor	(Q1)
CHPU-88-23	2SC2562 Silicon NPN Transistor	(Q2)
CHPU-88-24	2SC2749 Silicon NPN Transistor	(Q3)
CHPU-88-25	0.01 uf 50V Mylar Capacitor	(C6, C9, C27)
CHPU-88-26	0.1 uf 50V Mylar Capacitor	(C13)
CHPU-88-27	1000 pf 50V Mylar Capacitor	(C12)
CHPU-88-28	0.047 uf 630V Metallized Film Cap.	(C1, C4)
CHPU-88-29	0.22 uf 250V Metallized Film Cap.	(C10, C28, C29)
CHPU-88-30	2200 pf 2KV Ceramic-Disc Capacitor	(C2,C3,C11,C15,C18)
CHPU-88-31	4.7 uf 50V Al Electrolytic Cap.	(C7)
CHPU-88-32	47 uf 35V Al Electrolytic Cap.	(C8, C17)
CHPU-88-33	330 uf 200V Al Electrolytic Cap.	(C5)
CHPU-88-34	1000 uf 50V Al Electrolytic Cap.	(C16)
CHPU-88-35	3300 uf 10V Al Electrolytic Cap.	(C19~C26)
CHPU-88-36	100 Ohm 1/4W $\pm 5\%$ Carbon Resistor	(R9,R11,R12,R23,R24)
CHPU-88-37	1K Ohm 1/4W $\pm 5\%$ Carbon Resistor	(R4, R6, R15)
CHPU-88-38	1.5K Ohm 1/4W $\pm 5\%$ Carbon Resistor	(R25)
CHPU-88-39	2.4K Ohm 1/4W $\pm 5\%$ Carbon Resistor	(R26)
CHPU-88-40	10K Ohm 1/4W $\pm 5\%$ Carbon Resistor	(R7)
CHPU-88-41	24K Ohm 1/4W $\pm 5\%$ Carbon Resistor	(R17)
CHPU-88-42	30K Ohm 1/4W $\pm 5\%$ Carbon Resistor	(R8)
CHPU-88-43	5.1 Ohm 1/2W $\pm 5\%$ Carbon Resistor	(R19, R21)
CHPU-88-44	100 Ohm 1/2W $\pm 5\%$ Carbon Resistor	(R5)
CHPU-88-45	100K Ohm 1/2W $\pm 5\%$ Carbon Resistor	(R3, R14)
CHPU-88-46	5.1 Ohm 5W $\pm 5\%$ Cement Resistor	(R1)
CHPU-88-47	20 Ohm 5W $\pm 5\%$ Cement Resistor	(R22)
CHPU-88-48	30 Ohm 5W $\pm 5\%$ Cement Resistor	(R10)
CHPU-88-49	100 Ohm 5W $\pm 5\%$ Cement Resistor	(R16)
CHPU-88-50	510 Ohm 5W $\pm 5\%$ Cement Resistor	(R20)
CHPU-88-51	2K Ohm Vertical Cermet Trimpot	(VR2)
CHPU-88-52	50K Ohm Vertical Cermet Trimpot	(VR1)
CHPU-88-53	EI-40 Type 3D-0163 Switching Transformer	(TR)

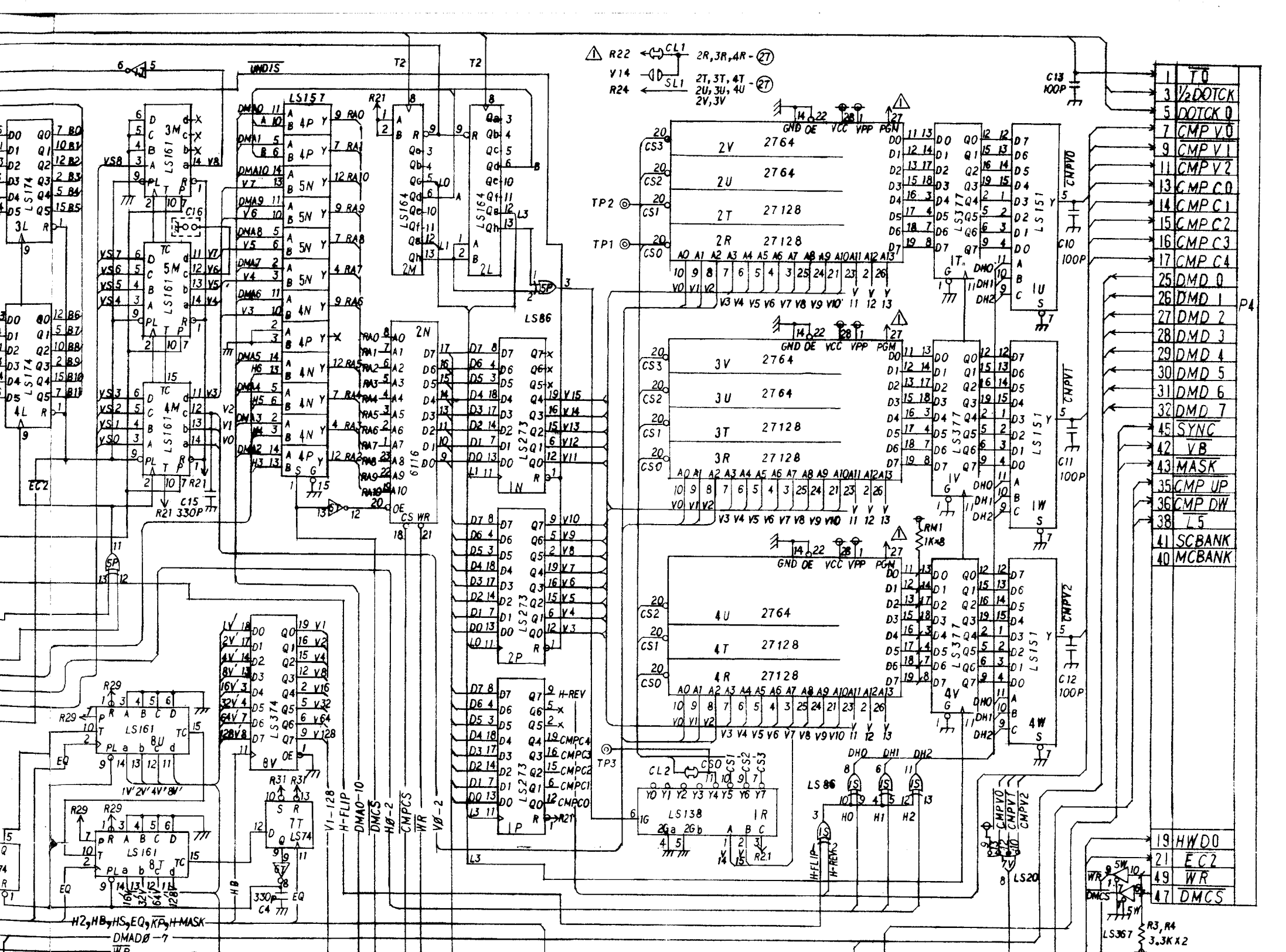
No.	DESCRIPTION (Reference Designations)	
CHPU-88-54	SC2A Choke Coil	(L1)
CHPU-88-55	SF-C27-00105-01 Choke Coil	(L2)
CHPU-88-56	3A SB FGMB NR Type Fuse	
CHPU-88-57	OG751-0062 Fuse Holder	(2 per assembly)
CHPU-88-58	Heat Sink Clip	(3 per assembly)
CHPU-88-59	Thermally Conductive Rubber	
CHPU-88-60	2-Pin AC Input Connector Receptacle on PCB	
CHPU-88-61	6-Pin DC Output Connector Receptacle on PCB	
CHPU-88-62	7-Pin DC Output Connector Receptacle on PCB	
CHPU-88-65	3D-0163-32 Type Heat Sink	
CHPU-88-63	3D-0163-30 Type Metal Frame	
CHPU-88-64	3D-0163-31 Type Metal Cover	
CHPU-88-66	3-Pin AC Input Connector Ass'y. on Metal Frame	
CHPU-88-67	9-Pin DC Output Connector Ass'y. on Metal Frame	
CHPU-88-68	12-Pin DC Output Connector Ass'y. on Metal Frame	
CHPU-88-69	Metal PCB Retainer	(4 per assembly)











R22 ← CL1 2R, 3R, 4R - (27)  
 V14 ← SL1 2T, 3T, 4T - (27)  
 R24 ← SL1 2U, 3U, 4U - (27)  
 2V, 3V

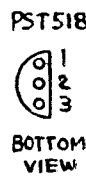
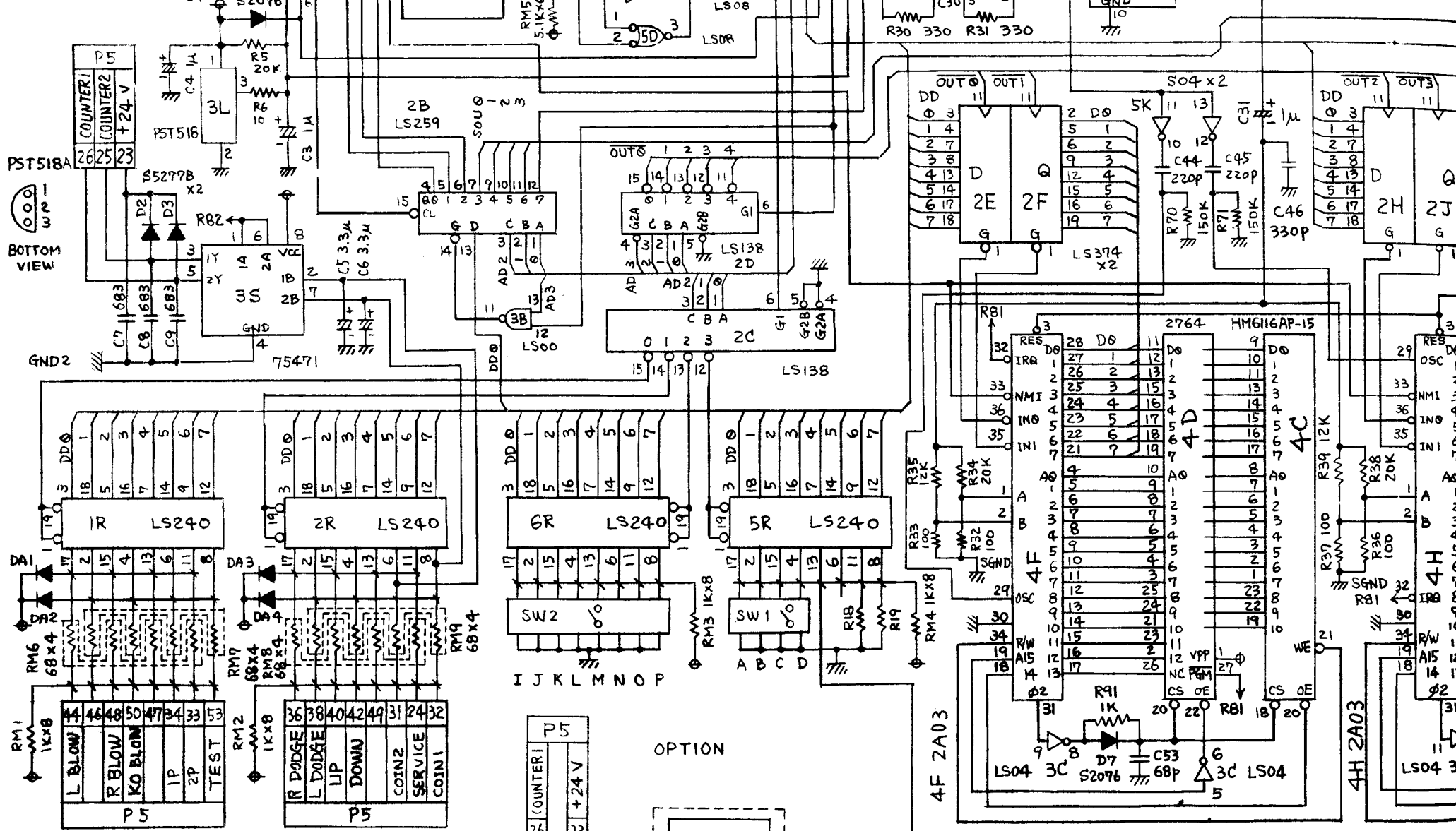
1	T0
3	1/2 DOTCK
5	DOTCK 0
7	CMP V0
9	CMP V1
11	CMP V2
13	CMP C0
14	CMP C1
15	CMP C2
16	CMP C3
17	CMP C4
25	DMD 0
26	DMD 1
27	DMD 2
28	DMD 3
29	DMD 4
30	DMD 5
31	DMD 6
32	DMD 7
45	SYNC
42	VB
43	MASK
35	CMP UP
36	CMP DW
38	L5
41	SCBANK
40	MCBANK

19	HWDO
21	EC2
49	WR
47	DMCS

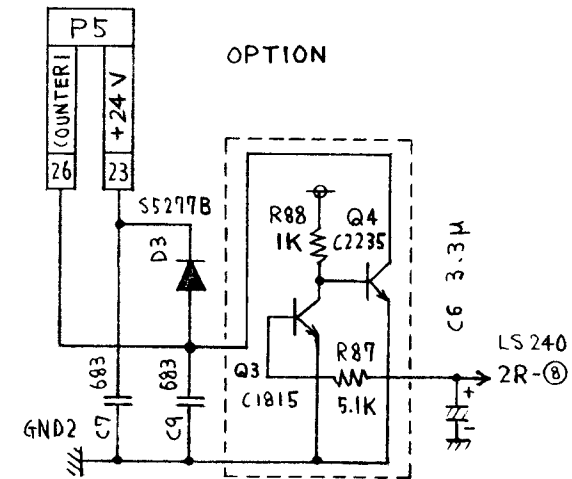
R3, R4  
 3.3K X 2  
 LS367



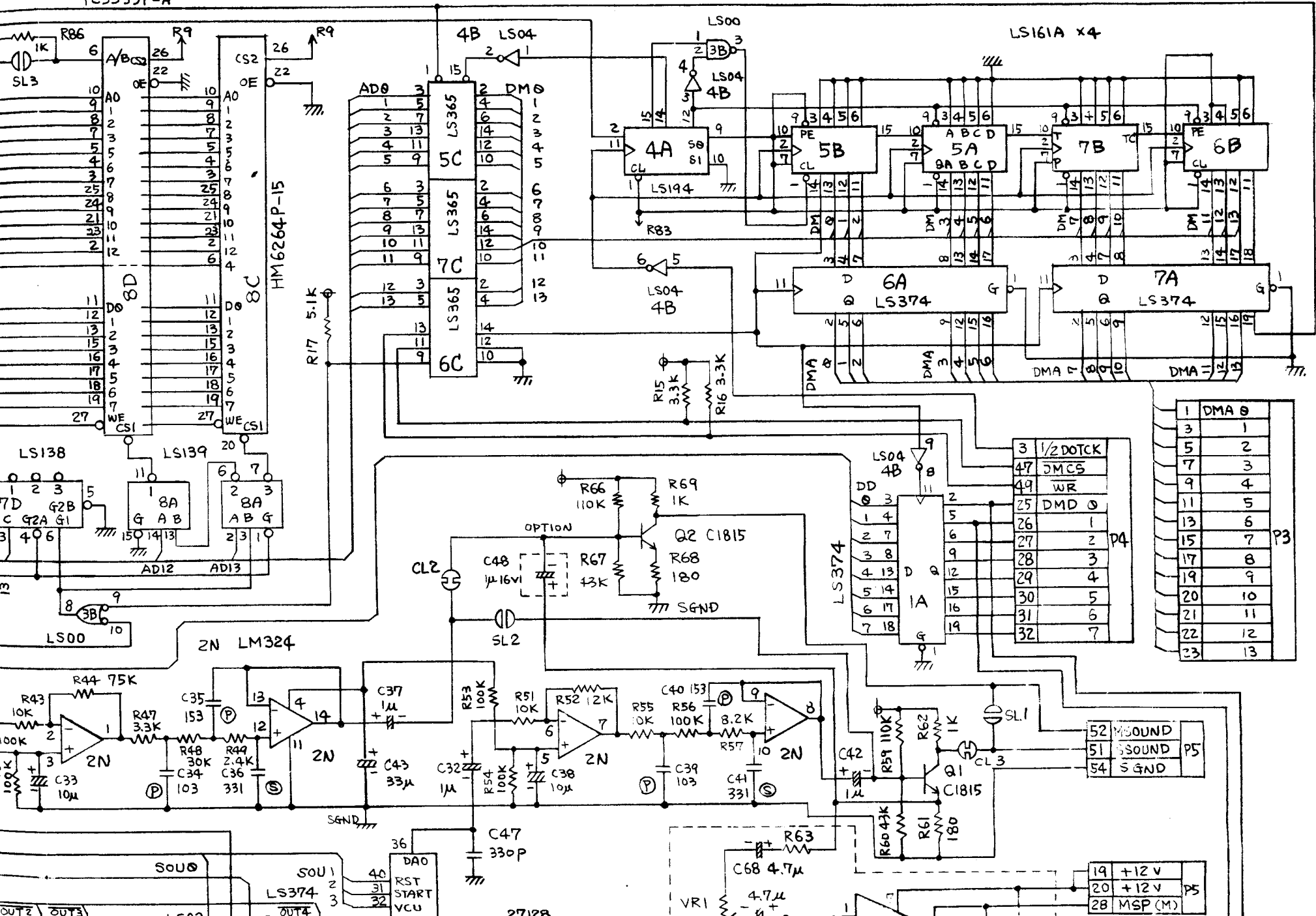




OPTION



TC5533P-A

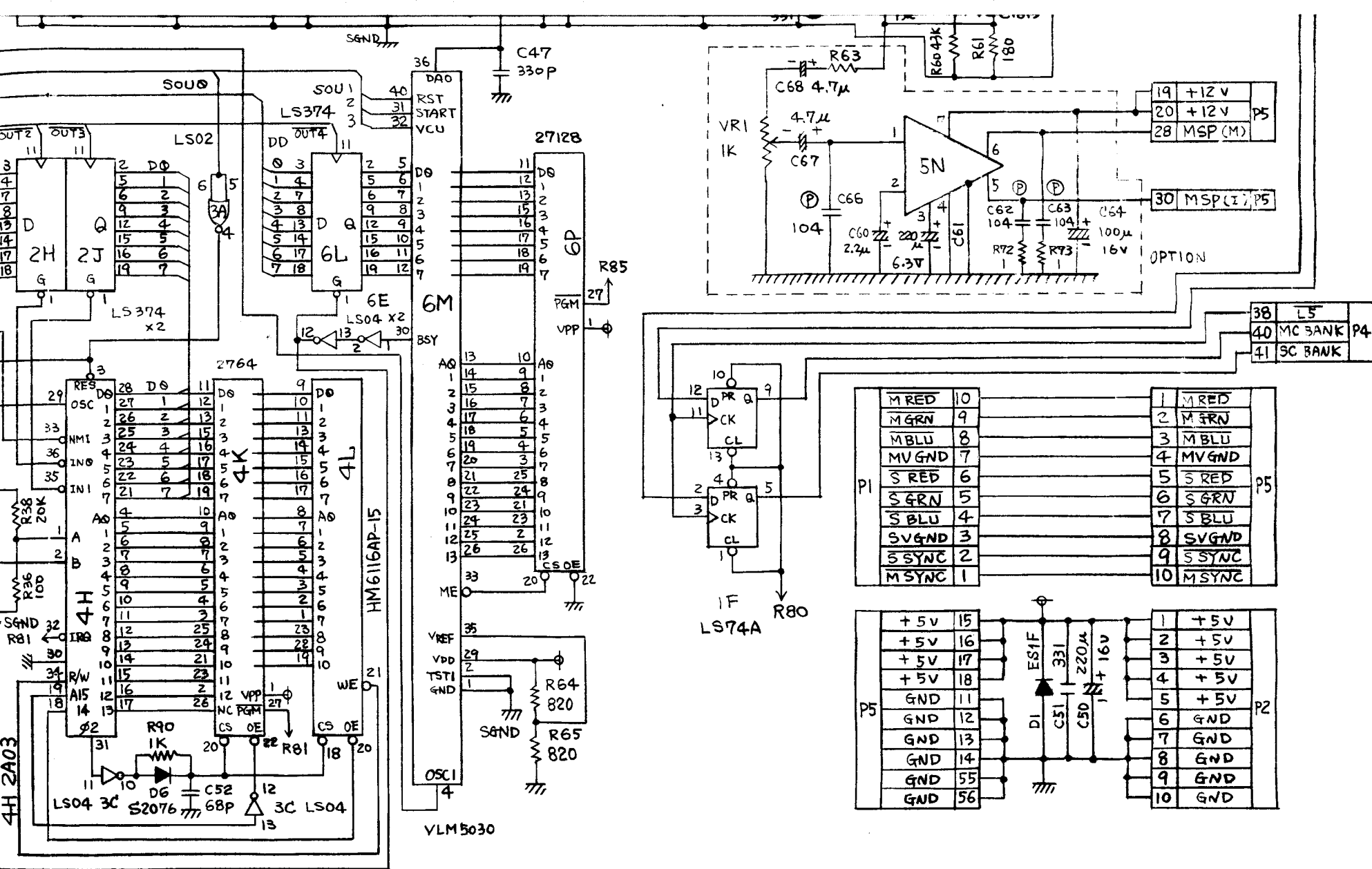


1	DMA 0
3	1
5	2
7	3
9	4
11	5
13	6
15	7
17	8
19	9
20	10
21	11
22	12
23	13

3	1/2 DOTCK
47	JMCS
49	WR
25	DMD 0
26	1
27	2
28	3
29	4
30	5
31	6
32	7

52	MSOUND	P5
51	SSOUND	
54	SGND	

19	+12V	P5
20	+12V	
28	MSP (M)	



**D** CHP1-CPU SCHEMATIC  
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 Revision 1